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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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22851	7590	07/13/2005	EXAMINER	
DELPHI TECHNOLOGIES, INC. M/C 480-410-202 PO BOX 5052 TROY, MI 48007			RIDLEY, BASIA ANNA	
			ART UNIT	PAPER NUMBER
			1764	

DATE MAILED: 07/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/782,619

Applicant(s)

GRIEVE ET AL.

Examiner

Basia Ridley



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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 13-24 is/are pending in the application.
- 4a) Of the above claim(s) 15-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 13 and 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>041305</u> . | 6) <input type="checkbox"/> Other: _____ |



DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Botti et al. (EP 1,047,144).

Regarding claims 1, Botti et al., in Fig. 1, discloses a method for main reformer startup comprising the steps of:

- introducing a first supply of fuel (11) and a first supply of air (59, 63) into a micro-reformer (10);
- producing a heated reformat in said micro-reformer (21);
- directing said heated reformat (21) through a main reformer (30);
- introducing a second supply of fuel (11) and a second supply of air (59, 63) to said main reformer (30) to produce a main supply reformat (50);

While the reference does not explicitly disclose increasing said first supply of fuel to produce a heated reformat, said step is inherent in the method of Botti et al.

3. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Botti et al. (USP 6,609,582).

Regarding claims 1, Botti et al., in Fig. 1, discloses a method for main reformer startup comprising the steps of:

- introducing a first supply of fuel (11) and a first supply of air (59, 63) into a micro-reformer (10);

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- producing a heated reformat in said micro-reformer (21);
- directing said heated reformat (21) through a main reformer (30);
- introducing a second supply of fuel (11) and a second supply of air (59, 63) to said main reformer (30) to produce a main supply reformat (50);

While the reference does not explicitly disclose increasing said first supply of fuel to produce a heated reformat, said step is inherent in the method of Botti et al.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 4, 6-10 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Botti et al. (EP 1,047,144) or Botti et al. (USP 6,609,582), as applied to claim 1 above.

Regarding claims 4 and 13-14 Botti et al. discloses all of the claim limitations as set forth above. Additionally, the references show that the micro-reformer is significantly smaller than the main reformer (see Fig. 1 in both references), but the references do not disclose specific catalyst volumes for the micro-reformer relative to the main reformer. The specific catalyst volumes in the reformers are not considered to confer patentability to the claims. As the reactor cost of construction and efficiency of operation are variables that can be modified, among others, by adjusting catalyst volumes, the catalyst volumes in the reformers would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed catalyst volumes cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the catalyst volumes in the micro-reformer relative to the main reformer in the methods of Botti et al. to obtain the desired balance between the construction

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cost and the operation efficiency (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223). Additionally it would have been obvious to one having ordinary skill in the art at the time of the invention to change the volume of catalyst ratio between the micro-reformer and main reformer, since such modifications would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). Where the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device, and the device having the claimed dimensions would not perform differently than the prior art device, the claimed invention is not patentably distinct from the prior art, *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Regarding claims 6-7 and 9 Botti et al. discloses all of the claim limitations as set forth above, but the references do not disclose specific equivalence ratios of first and second fuel during the disclosed process. The fuel equivalence ratios are not considered to confer patentability to the claims. As the operation temperature and product composition are variables that can be modified, among others, by adjusting fuel equivalence ratios, the fuel equivalence ratios in the reformers would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed fuel equivalence ratios cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the fuel equivalence ratios in the micro-reformer and the main reformer in the methods of Botti et al. to obtain the desired operation temperature and product composition (*In re Boesch*, 617 F.2d. 272, 205

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USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Regarding claims 8 and 10 Botti et al. discloses all of the claim limitations as set forth above, but the references do not disclose said micro-reformer having a catalyst exit temperature of about 500°C of greater. The specific product temperatures are not considered to confer patentability to the claims, since said temperatures are function of, among others, of operating conditions and fuel used in the reformers. Therefore, the catalyst exit temperature of the micro-reformers would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed catalyst exit temperature of the micro-reformers cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the catalyst exit temperature of the micro-reformers in the methods of Botti et al. to be based on desired operation temperature and fuel composition (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

6. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Botti et al. (EP 1,047,144) or Botti et al. (USP 6,609,582), as applied to claim 1 above, and further in view of Silberring (USP 4,391,794).

Regarding claims 2 and 11, Botti et al. disclose all of the claim limitations as set forth above, but the references do not disclose said method further comprising electrically pre-heating said micro-reformer.

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Silberring teaches a method wherein portion of heat required for heating of the feedstock and for the endothermic reaction is provided by electric heating. Said method reduces requirements for hydrocarbons and energy (C1/L46-68).

It would have been obvious to one having ordinary skill in the art at the time of the invention to electrically pre-heating said micro-reformers of Botti et al., as taught by Silberring, for the purpose of improving operating efficiency by reducing the requirements for hydrocarbons and energy.

Regarding claim 3, Botti et al. in view of Silberring disclose all of the claim limitations as set forth above. Additionally Botti et al. disclose the method wherein

- said micro-reformer has an inlet air temperature of about 140°C or greater and catalyst exit temperature of about 300°C of greater (see [0043] and [0047] in Botti'144 and C8/L33-44 and C9/L27-36 of Botti'582).

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Botti et al. (EP 1,047,144) or Botti et al. (USP 6,609,582), as applied to claim 1 above, and further in view of Hsy et al. (USP 5,58,314).

Regarding claim 5, Botti et al. disclose all of the claim limitations as set forth above. Additionally, while the references do not explicitly disclose material of composition for said main reformer, use of reformers consisting essentially of catalyst and ceramic compositions was conventional in the art at the time of the invention, as evidenced by Hsy et al. (C6/L15-29). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use a reformer consisting essentially of catalyst and ceramic compositions as a main reformers of Botti et al., since doing so would amount to nothing more than a use of a known apparatus for its intended use in a known environment to accomplish entirely expected result.

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8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Response to Arguments

9. Applicant's arguments filed on 13 April 2005 have been fully considered but they are not persuasive.

10. The applicant argues that Botti et al. does not support examiner's conclusion that it is inherent to increase the supply of fuel to the start-up reformer after the first supply of fuel is provided to the start-up reformer. This is not found persuasive. Examiner notes that during start-up of any reactor the reactant supply is always, inherently, increased over a period of time from the time the initial amount of the reactant reaches the reactor until the desired reactant flow rate is reached. At its simplest, this is a function of gradually opening a valve controlling the flow of the reactant to the reactor from completely closed position to fully open position (or any position in between, at which desired reactant flowrate is obtained).

11. The applicant argues that comparing the size of the start-up reformer and the main reformer from Fig. 1 does not suggest the relative catalyst sizes, because the main reformer of Botti et al. is being shown as being incorporated into an engine (30), and there is nothing in Fig. 1 of Botti et al. to show the size of main reformer by itself. Additionally the applicant argues that in Botti et al. the reformat from the start-up reformer is provided to the engine (30) so the engine can produce shaft

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power and not to the main reformer, as recited in instant claims. This is not found persuasive.

Contrary to applicant's interpretation of the reference, Botti et al. does not disclose engine (30) which comprises various components, one of which is a main reformer. However Botti et al. discloses an engine (30) which is a reformer, as it is configured to produce hydrogen rich engine exhaust (see C1/L6-10, C3/L65-67, C4/L55-57, etc.). The reference also discloses the method wherein heated reformat (21) produced by the start-up reformer (10) is directed through said main reformer (30), see C5/L1-6 and C9/L53-57.

12. The applicant argues that Botti et al. discloses that reformat (21) produced by the start-up reformer is used to produce shaft power while in the instant claims at least a portion of said reformat produced by the start up reformer is burned in the main reformer to heat the main reformer, therefore the relative demands of the start-up reformers of the instant invention and Botti et al. are different, and the start-up reformer of Botti et al. reference may result in different catalyst ratios or fuel equivalence ratios then the ones recited in the instant claims. This is not found persuasive. Contrary to applicant's arguments, Botti et al. does, in fact, disclose that at least a portion of reformat (21) produced by the start up reformer (10) is burned in the main reformer (30), see C9/L53-57.

Further, the examiner has not relied on the disclosure of Botti et al. to teach the specific catalyst ratios or fuel equivalence ratios as recited in rejected claims. The examiner has, however, relied on recognized by courts "result effective variable" as an indicator of obviousness type of rejection. See *Ex parte Raske*, 28 USPQ2d, 1304. For a variable to be considered "result effective variable", it has to, when modified, achieve a recognized result (see MPEP 2144.05). A person having ordinary skill in the art would have found it obvious to determine the optimum value of any result effective variable recognized in the art, as it has been held that if the difference between the

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claimed invention and the prior art involves the discovery of an optimum value of a result effective variable in a known process, such a discovery is ordinarily within the skill level of the art. *In re Boesch and Slaney*, 617 F.2d. 272, 276 [205 USPQ 215, 219] (CCPA 1980). See *Consolidated Aluminum Corp. v. Foseco Int'l Ltd.* 10 USPQ2d 1143 (District Court Northern District of Illinois 1988).

In the instant case, it was known in the art at the time the invention was made that the reactor cost of construction and efficiency of operation are variables that can be modified, among others, by adjusting catalyst volumes, and that the operation temperature and product composition are variables that can be modified, among others, by adjusting fuel equivalence ratios. Therefore the catalyst volumes in the reformers and the fuel equivalence ratios in the reformers would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed catalyst volumes and fuel equivalence ratios cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the catalyst volumes in the micro-reformer relative to the main reformer and the fuel equivalence ratios in the method of Botti et al. to obtain the desired balance between the construction cost and the operation efficiency and to obtain the desired operation temperature and product composition (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223). Such being the case, granted the examiner has a prima facie case, as set forth above, the burden of proof now shifts to the applicant to demonstrate by evidence that the instantly claimed percentages are critical to patentability. See *Ex parte George*, 21 USPQ2d, 1058. Because there is substantial evidence to support determination

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of a prima facie case of obviousness over each of the applied prior art references, the burden of proof was properly shifted to the applicants to rebut the prima facie case by presenting persuasive arguments or evidence (e.g. unexpected results). *In re Mayne*, 104 F.3d 1339, 1343, 41 USPQ2d 1451, 1455 (Fed. Cir. 1997). ("With a factual foundation for its prima facie case of obviousness shown, the burden shifts to applicants to demonstrate that their claimed fusion proteins possess an unexpected property over the prior art."). Unexpected results must be established by factual evidence; mere argument or conclusory statements in the specification do not suffice. *In re Geisler*, 116 F.3d 1465, 1470, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997) (quoting *In re De Blauwe*, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984)).

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Basia Ridley, whose telephone number is (571) 272-1453.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola, can be reached on (571) 272-1444.

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The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Technical Center 1700 General Information Telephone No. is (571) 272-1700. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Questions on access to the Private PAIR system should be directed to the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).



Basia Ridley
Primary Examiner
Art Unit 1764

BR
July 8, 2005